PAHSIMEROI HATCHERY

1990 Summer Chinook Brood Year Report

by

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January 1993

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ABSTRACT

The trap was set up on June 18 and was pulled on October 12, 1990. Chinook salmon started entering the trap on June 19, with the majority of the run concluding by September 24. The first fish were spawned on August 24, and spawning concluded on September 28, 1990.

No spring chinook were trapped this year. A total of 470 summer chinook were trapped during 1990, which consisted of 206 adult males, 225 females, and 39 jacks.

The age class breakdown was as follows: All males with a fork length of 64 cm and under were called jacks (5 males over 64 cm were called jacks due to their slender appearance and overall body size), males and females that measured 65 cm through 82 cm were called 4-year-olds, and all fish 83 cm and greater were 5-year-olds. The males were made up of 39 jacks, 191 4-year-olds, and 15 5-year-olds. The females were composed of 198 4-year-olds and 27 5-year-olds.

A total of 149 summer chinook were released above the weir to spawn naturally in the Pahsimeroi River. These fish were composed of 69 females, 65 adult males, and 15 jacks. Five jacks were released in the Lemhi River for the Shoshone-Bannock Indian fishery.

Pre-spawning mortality amounted to 3 females and 2 males. This amounts to 1.58% of the ponded fish. All fish held for spawning were injected with erythromycin phosphate to reduce mortality from kidney disease.

A total of 151 summer chinook females were spawned for 662,641 green eggs. Fecundity averaged 4,388 eggs, and an eye-up of 95.28% was achieved, leaving 631,342 eyed eggs.

A total of 605,900 smolts were raised for a total of 39,502 pounds of fish at 15.25/lb, with an overall feed conversion of 1.59 for the brood year. At release, the smolts had an average fork length of 5.25 inches (133 cm).

The smolts were released during the week of March 13 through 20, 1992.

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INTRODUCTION

Funding Source

Pahsimeroi Hatchery is owned and funded by Idaho Power Company (IPC) and is operated by the Idaho Department of Fish and Game. The salmon and steelhead programs are mitigation for the IPC dams constructed on the Snake River in Hells Canyon.

Location

The hatchery is located near Ellis, Idaho. The trapping, incubation, and early rearing facility is on the Pahsimeroi River, one mile upstream from its confluence with the Salmon River. The chinook final rearing ponds are located at a separate facility seven miles upstream on the Pahsimeroi River.

Species Handled

The hatchery is a spawning station for both steelhead and summer chinook salmon, as well as a rearing station and release site for the summer chinook. It also serves as a release site for steelhead smolts reared at other facilities.

Synoptic History

Pahsimeroi fish were historically a native run. The fish were considered a summer chinook because of their late arrival and late spawning time. Spring chinook eggs from Rapid River Hatchery and *Hayden* Creek Hatchery were incubated at Pahsimeroi and released as smolts in the years of 1982-1986. The spring chinook returned in May and June, The spring chinook stock was phased out and South Fork summer chinook eggs were received from McCall Hatchery in the years 1985-1988. These fish were released as smolts with Pahsimeroi stocks.

OBJECTIVES

Mitigation Goals

The mitigation goals of the Pahsimeroi Hatchery are to rear one million summer chinook smolts for release into the Pahsimeroi River.

IDFG Objectives

1. To increase the number of summer chinook adults back to the Pahsimeroi River.

2. To provide enough adult summer chinook above Lower Granite Dam for natural spawning, as well as a sport fishery.

HATCHERY FACILITIES

Hatchery Description

Located on the lower hatchery site is the fish trap, consisting of three concrete holding pens, a series of ladders into the structure, and a metal finger weir to keep the fish from returning to the river. A 55-foot-wide weir crosses the Pahsimeroi River to guide the arriving fish into the trap facility.

Near the trap facility lies a residence, two pump houses, a 10,000-gallon water storage tank, a metal shop building, a building with a two-bedroom dormitory and workshop and a cinder block office building with a public restroom and an incubator room. There are also four concrete raceways which are used for early rearing of salmon.

Located seven miles above the trap is a separate final rearing facility. The facilities at the upper site include a residence, a small storage building, a feed bin for storing dry *bulk* feed, a walk-in freezer for storing frozen salmon feed, and two dirt rearing ponds.

Production Capacities

The trap is constructed of three concrete pens measuring 15 ft x 75 ft x 4.7 ft deep. The center pen acts as the trap, and the two outside pens are used to separate the males from the females. Each pen can hold 500 adult salmon until they are spawned.

The incubator room houses 20 double-stack Heath incubators. These stacks have the capacity to incubate 1,900,000 eggs to button-up fry.

The four early rearing raceways are 4 ft x 109 ft x 2.1 ft deep. They are capable of rearing 1.1 million fingerling to a ponding size of 300 fish/pound. The limiting factor of production units is the amount of early rearing space.

The two dirt rearing ponds are 48 ft x 285 x 3.5 ft deep. They have the capacity to rear 1.3 million smolts to release.

RECOMMENDATIONS

Early Rearing

A disease-free water source (well water) as well as additional early rearing summer chinook raceways, are needed to diminish the incidence of Whirling Disease. These raceways would also provide the hatchery the opportunity to mass mark chinook.

Final Rearing

Cement walls or divide ponds into four concrete ponds to insure smolt quality, hatchery evaluation studies, and prevent bird and otter depredation.

Trapping

Modify fish trap and holding ponds with a lift station to facilitate adult fish handling and spawning.

Facility Needs

1) New office, visitors center, and public restroom.
2) New residence for upper facility.
3) Safety guard rails for walkways and weirs.
4) Storage shed for upper site.

WATER SUPPLY

Source

Spring water is the main water source for egg incubation. The system is switched over to use river water from the time the chinook eggs have eyed-up until the fry button-up and are put out into the raceways.

Rearing water for the hatchery is supplied by the Pahsimeroi River, which has a high organic load during winter, but improves during the summer months.

Amount Available

We have water rights for 20 cfs to the ponds and 40 cfs to the trap and raceways for early rearing. There are 5 cfs of spring water available for egg incubation.

Water Temperatures and Chemistry

The spring water varies in temperature from 52°F to 55° F, and has a Ph of 7.8. The river water varies in temperature from 32°F to 67°F, with a Ph range of 7.0 to 8.8, and hardness of 100 to 180 mg/L CaCO2.

Access

The incubation system relies on pumping spring or river water up to a 10,000-gallon holding tank. The stacks are then gravity-fed from the tank. The raceways, trap and ponds are all gravity-fed from the river.

STAFFING

The hatchery is staffed with two permanent employees; a Hatchery Superintendent II and a Hatchery Superintendent I. Several temporaries are employed at various times of the year to help with the spawning of steelhead and salmon.

FISH PRODUCTION

Summer Chinook Trapping

Trapping Dates

The trap was set up on June 18 and was pulled on October 12, 1990. Chinook salmon started entering the trap on June 19, with the majority of the run concluding by September 24. The peak of the run came during early July, with a second smaller peak in late August (Appendices 4 and 5).

Total Fish Trapped

A total of 470 fish were trapped. This breaks down into 431 adults and 39 jacks. Of these fish, a total of 65 adult males, 69 females, and 15 jacks were released above the weir to spawn naturally in the Pahsimeroi River.

Five jacks were released in the Lemhi River, along with 7 jacks from Sawtooth Hatchery. The fish were placed in an enclosed section of the river, between two installed weirs, for a Shoshone-Bannock Indian fishery.

Sex Ratio

The 470 fish trapped this year consisted of 225 females, 206 adult males, and 39 jacks. This comes out to 47.87% female and 52.12% total male.

Age Class Breakdowns

Fork lengths were taken on all fish entering the trap (Appendix 1). The age class breakdown was done mostly by length this year. All males 64 cm and under were classified as jacks. There were 5 males over 64 cm that were also called jacks because of their slender shape and overall body size. Male and female fish that measured 65 cm through 82 cm were classified as 4-year-olds, and all fish 83 cm and over were called 5-year-olds. This gives an overall breakdown of 39 jacks, 389 4-year-olds (191 males, 198 females) and 42 5-year-olds (15 males, 27 females).

There were 69 females and 80 males released into Pahsimeroi River to spawn naturally. The age class of these males consisted of 15 jacks, 56 4-year-olds, and 9 5-year-olds. The age class of the females consisted of 62 4-year-olds and 7 5-year-olds. An additional 5 jacks were released into the Lemhi River.

Holding and Spawning Record

Of the 225 females and 245 males trapped, their disposition is as follows:

FEMALES	MALES
69 released	65 adults released
151 spawned	139 adults available for spawning
3 pre-spawn mortality	39 jacks - 6 spawned,20 released
1 BKD rejected	2 pre-spawning mortality
1 green rejected	

Adult Treatments

All fish that were held for spawning this year were injected with erythromycin phosphate to help prevent BKD mortalities. The dosage was 4.5 mg per pound of fish. In addition, the female pen was treated with formalin for ten weeks, three times a week, for one hour with 166.7 ppm formalin. This helped reduce fungus buildup.

The holding pond water temperatures got up to 68°F during the afternoons, so several other things were done to maintain the health of the brood fish. A black plastic shade cover was placed over the water of the female pen to reduce the stress from the public. The yard lights were turned off and kept out all summer to induce the fish to ripen earlier. The fish were left undisturbed after their initial sorting in the trap until August 20, when we started sorting for ripe fish.

Pre-Spawning Mortality

Pre-spawning mortality was the lowest it has been in the last decade. It amounted to only 3 females and 2 males, or 1.58% of the ponded fish. Three of the mortalities appeared to be from BKD and the other two from mechanical jumping injuries.

Summer Chinook Spawning Information

Summer chinook spawning began on August 24, continued twice a week, and concluded on September 28.

Females were sorted twice a week for ripeness. Ripe fish were killed by a blow to the head and bled by severing the caudal artery. Salmon were spawned, by the incision method, at a ratio of one female to one male, with at least 3% of the males being jacks.

A total of 151 females, 6 jacks, and 139 males (6 males were spawned twice) were spawned.

The females produced 662,641 green eggs. Egg numbers were calculated after the eyed eggs were shocked and then hand-picked. Dead eggs were counted, and all eggs were measured using the displacement method. The dead egg numbers were added to the good egg numbers to get the initial green egg numbers.

Fecundity averaged 4,388 eggs per female (662, 641 green eggs divided by 151 females).

The eggs were water-hardened in a 100 ppm Argentyne solution for 30 minutes in the incubator trays. The trays were then pushed back into the water flow to continue water hardening in fresh water.

The eggs were loaded into the incubator trays with one female per tray.

Since the fish were injected with erythromycin and treated with formalin, the carcasses were hauled to the animal pit at the landfill to be buried.

Incubation

After stripping the male over the eggs, they were hand-stirred and allowed to sit for five minutes before being placed in the incubator trays and water-hardened in 100 ppm iodine.

The incubator trays *were* loaded with eggs from one female until eye-up. After 48 hours, daily treatments of 1,667 ppm formalin were used to reduce fungus growth before eye-up. After the eggs were picked, the trays were loaded at 1,000 ml per tray.

Each incubator stack received 5 gallons per minute of spring water. In late October, after all lots of the eggs were eyed and picked, the incubator system was switched from spring water to the cooler river water to retard fry development.

While on 54°F spring water, the eggs take 450 temperature units (TU's) to eye-up. After the system is switched to river water, the temperature cools gradually from a daily average of 49°F to 37°F. It takes 900 TU's to hatch and 1,600 TU's to button-up (1,650 for the last lots). Fish were transferred to the raceways from November until February.

After 20 days, the eyed eggs were shocked by pouring them out of the tray into a dish pan, and then pouring them back into the incubator tray with a drop of 1.5 to 2 feet into the water. The dead eggs were then hand-picked. Dead eggs were counted, and all eggs were measured using the displacement method. The dead egg numbers were taken from the initial green egg numbers to get the percent eye-up.

Eye-up was 95.28% for a total of 631,342 eyed eggs.

Early Rearing

Transfer of salmon fry into the raceways began during mid-November and continued through February 26. A total of 617,053 fry were divided among the four raceways at approximately 154,000 each.

The initial density index was .13 for each of the four raceways. By the time the fish were ponded in late April, the density index was .29 for each raceway.

The water flows were maintained at 264 gallons per minute in each raceway.

Mortality in the raceways amounted to 9,052 fish through April. These mortalities were steady throughout the early rearing period, with an increase occurring in March and April just prior to ponding. This increase normally occurs due to environmental gill.

Water temperatures for early rearing fluctuated from 37°F in the winter (daily fluctuations varied from 33°F to 44°F) to a 48°F average in April (daily range of 39°F to 49°F).

Initially, these fish were hand-fed BioDiet starter and grower at a rate of 3% of body weight. In February and March, as the water temperature warmed up, the fish were fed at 4% of body weight, dropping back to 3.5% in April.

During March and April, three weeks prior to ponding, all fish were fed a prophylactic treatment of Gallimycin for 14 days to prevent BKD. They were fed at the rate of 4.5 g per 100 pounds of fish per day.

The fish were ponded between April 20 and 30 this year. Pond one received 256,795 fish, and pond two received 351,197 fish. At ponding, the fish had reached an average of 293 fish per pound for a total of 2,080 pounds of fish. They had been fed a total of 4,518 pounds of feed for an average conversion to date of 2.86 during their early rearing.

Final Rearing

The 607,992 fish were divided between the two earthen ponds. The initial loading density index of each pond was .02, and an average density index of .08 was reached at time of release.

Water flows to the ponds were set at 1,750 gpm (4 cfs) during May, and increased to and maintained at 2,300 GPM (5 cfs) for the remaining rearing cycle.

Mortalities during the final rearing amounted to approximately 2,300 fish. These mortalities were scattered throughout the rearing cycle with no major increases. Bird predation and natural mortality were the sources of the loss.

Water temperatures in the ponds ranged daily from 50°F to 66°F during the summer months down to 33°F to 39°F daily during the winter.

All fish were fed Bio Products BioMoist feed pellets after ponding, starting at 2% and decreasing down to 1.5% as the fish increased in size. Mother 14-day Gallimycin treatment was fed during late July and early August. They were fed at the rate of 4.5 g/100 pounds of fish per day.

Throughout the winter, the ponds were ice-covered for several different weeks. The fish were fed maintenance diet during the ice-free periods of the winter.

During their final rearing in the ponds, the fish were fed 57,555 pounds of BioMoist feed for a conversion of 1.54 during this period.

The fish were fed a total of 62,073 pounds of feed for a conversion of 1.59 for the entire brood year.

A total of 605,900 fish (39,502 lbs at 15.25/ib) were released during the week of March 14-20, 1992.

Fish Health

Pathogens of concern at this facility are Myxobolus cerebralis (whirling disease), IPN, and Renibacterium salmoninarum (BKD). In early raceway rearing, the water source is turbid and Bacterial Gill Disease (BGD) is a chronic problem. Usually BGD is caused by the filamentous bacteria of the genus Flavobacterium. Flexibacter psvchrophilus can also be found at this facility, but usually does not cause problems.

Presently, the focus of fish health at this station is controlling whirling disease and BKD. Efforts are being initiated to early rear the juvenile chinook in a specific pathogen free (SPF) water source. This procedure may lessen the impact of M. cerebralis by allowing ossification to harden the skeleton of the fish and, thus, becoming less susceptible to infection. If the impacts of this procedure are not significant in reducing the disease, more conventional methods of fish culture (concrete raceways) will be suggested.

Pahsimeroi Hatchery, like other IDFG anadromous hatcheries, is using erythromycin to limit infection and disease from BKD. In the future, different medicated feeding strategies may be implemented to enhance drug absorption by the fish. Of the anadromous hatchery stocks of IDFG, Pahsimeroi has the lowest prevalence of BKD in brood and juvenile fish (determined by ELISA).

IPN can only be controlled by destroying sick fish. To do otherwise would amplify and disseminate the etiologic agent. A program of destroying high titer eggs has been implemented at this station. This program should be continued and involve a cull/segregation program.

Special care should be taken by the personnel at Pahsimeroi and Sawtooth hatcheries so that fish, equipment, and other possible vectors do not transfer etiologic agents from one hatchery to the other.

SABYRE90

Juvenile samples

Case #	Stock	Date	Data
91-47	Pah SU	3/7/91	Viro: 0/11 BK(FAT): 0/8 Bact: 5/8+MAS
91-155	Pah SU	5/17/91	BK(FAT): 0/10 Bact: 0/8
91-193	Pah SU	6/25/91	Bact: 0/8 Viro: 0/10 BK(FAT): 0/10
91-212	Pah SU	7/24/91	BK(FAT): 0/60 Viro: 0/60 PW: 1/6+
91-215	Pah SU	7/24/91	VE: 0/10
91-225	Pah SU	8/10/91	Viro: 0/10 BK(FAT): 0/10 PX: 0/10
91-293	Pah SU	9/25/91	BK(FAT): 0/12 Viro: 0/10
92-04	Pah SU	1/8/92	Bact: 6/8+ Flexibacter PW: 0/10 Viro: 0/10
92-50	Pah SU	2/26/92	BK(ELISA): 5/6+ pools (low) BK(FAT): 0/60 Viro: 0/60

Brood Samples

Chinook

91-252	Pah SU	8/27/91	BK(ELISA): 3/7+ (low) Viro: 0.7
91-263	Pah SU	9/6/91	BK(ELISA): 1/18+ PW: 1/14+
91-264	Pah SU	8/30/91	BK(ELISA): 0/7 Viro: 0/7
91-265	Pah SU	9/3/91	BK(ELISA): 1/14+ Viro: 0/14
91-278	Pah SU	9/13/91	BK(ELISA): 0/17 Viro: 0/35
91-294	Pah SU	9/20/91	BK(ELISA): 1/5 VE: 0/60
91-299	Pah SU	9/27/91	BK(ELISA): 0.8

Steelhead

92-67	Pah STA	3/9/92	Viro: 0/10
92-81	Pah STA	3/12/92	Viro: 0/30
92-88	Pah STA	3/16/92	Viro: 0/76
92-96	Pah STA	3/19/92	Viro: 0/61
92-103	Pah STA	3/23/92	Viro: 0/64
92-114	Pah STA	3/26/92	Viro: 0/79
92-120	Pah STA	3/30/92	Viro: 0/98
92-127	Pah STA	4/2/92	Viro: 0/43
92-140	Pah STA	4/6/92	Viro: 2/50+ IHNV
92-144	Pah STA	4/9/92	Viro: 0/36
92-149	Pah STA	4/13/92	Viro: 0/38
92-166	Pah STA	4/16/92	Viro: 0/28
92-169	Pah STA	4/20/92	Viro: 0/24

Fish Marking

A total of 302 fish were PIT tagged in November of 1991. These tags were to evaluate the fish migration. There was no increase in mortality due to the handling and marking of the fish.

Fish Distribution

Brood year 1990 hatchery releases included 149 adult summer chinook salmon (69 females, 65 males, and 15 jacks) into the Pahsimeroi River to spawn naturally from June 20, 1990 through October 6, 1990, and 5 additional jacks were transported to the Lemhi River on July 27, 1990 for a Shoshone-Bannock Tribal fishery.

The summer chinook pond release amounted to 605,900 fish during the week of March 13, 1992. The screens were pulled the first day, and one set of dam boards was pulled daily throughout the rest of the week until the ponds were drained. The final smolts left the pond by March 20, 1992.

HATCHERY IMPROVEMENTS

Hatchery improvements during this brood year include installing an air conditioner in the office and an emergency eye wash station in the incubator room. All the fences around the property lines were tightened and repaired. The water storage tank and the feed shed at the ponds were painted. Additional baffles were made and installed for all raceways. Guard rails were installed on all walkways to the feeder and the diversion weir at the ponds. New fence was installed around the fish trap.

The roof on the trap residence was repaired and the asphalt shingles replaced with new painted metal roofing. The floor near the entrance in the apartment was repaired, and vent holes were drilled to improve circulation under the apartment building. The water measuring weir in the trap canal was repaired and re-set. Walkways at the trap canal intake were reset after the cement was recapped. The head and tail races of the raceways were covered with planking.

ACKNOWLEDGEMENTS

The crew at Pahsimeroi Hatchery would like to express their appreciation to all those who helped with the spawning and transporting of steelhead and salmon. We would also like to thank Paul Abbott and the staff of Idaho Power Company for their continued help and support.

A P P E N D I C E S

Appendix 1. Length frequency of total summer chinook trapped, 1990.

	(cm) Length	Jacks	Adult males	Adult females	(inches) Length
	44				17.3
	45	1			17.7
	46				18.1
	47	2			18.5
	48				18.9
T	49	2			19.3
o	50				19.7
t	51				20.1
a	52				20.5
1	53				20.9
	54	2			21.3
F	55				21.7
i	56				22.0
s	57				22.4
h	58				22.8
	59	1			23.2
T	60	1			23.6
r	61	2			24.0
a	62	3			24.4
p	63	8			24.8
p	64	9		2	25.2
e	65	2	2	3	25.6
d	66	2	7	2	26.0
	67	1	8	2	26.4
	68		7	2	26.8
	69		14	5	27.2
	70		11	8	27.6
	71		7	13	28.0
	72		14	12	28.3
	73		22	20	28.7
	74		15	15	29.1
	75		16	15	29.5
	76		8	16	29.9
	77		12	24	30.3
	78		11	24	30.7
	79		11	10	31.1
	80		14	6	31.5
	81		7	7	31.9
end 4	82		5	12	32.3
5's	83		5	4	32.7
	84		2	2	33.1
	85		2	1	33.5
	86		2	1	33.9
	87		3	4	34.2
	88			4	34.6
	89			4	35.0
	90			2	35.4
	91			2	35.8
	92				36.2
	93			1	36.6
	94		1	2	37.0
	95				37.4
	96				37.8

General length frequency breakdowns - Male and Female:
Jacks - 64 cm and under, 4-y-o - 65 cm to 82 cm, 5-y-o - 83 cm and over.

Appendix 2. Length frequency of released summer Chinook, 1990.

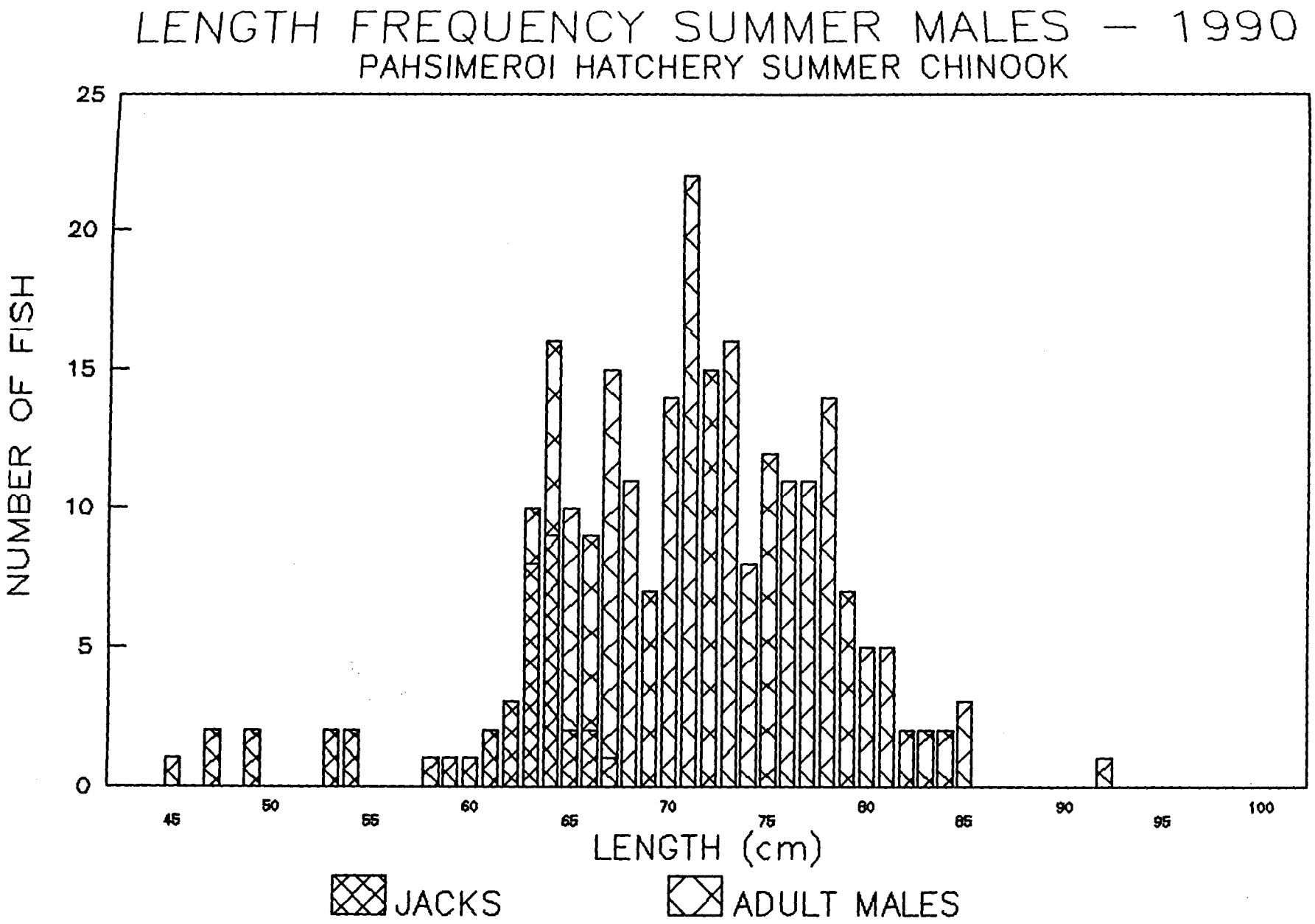
	(cm) Length	Jacks	Adult males	Adult females	(inches) Length
	44				17.3
	45	1			17.7
	46				18.1
	47	2			18.5
	48				18.9
R					19.3
e	50				19.7
l	51				20.1
e	52				20.5
a					20.9
s	54				21.3
e	55				21.7
d	56				22.0
	57				22.4
F	58				22.8
i	59				23.2
s	60				23.6
	61	1			24.0
h					
	62	2			24.4
	63	4			24.8
	64	1			25.2
4's -	65	1	1	3	25.6
	66		3	2	26.0
	67		2	1	26.4
	68				26.8
	69		3	2	27.2
	70		1	2	27.6
	71		3	7	28.0
	72		6	4	28.3
	73		8	1	28.7
	74		5	8	29.1
	75		5	3	29.5
	76		2	7	29.9
	77		3	6	30.3
	78		3	6	30.7
	79		5	2	31.1
	80		5	3	31.5
	81		1	1	31.9
end 4	82			3	32.3
5's -	83		3	2	32.7
	84		1		33.1
	85		1		33.5
	86		1	1	33.9
	87		2	2	34.2
	88				34.6
	89			2	35.0
	90				35.4
	91				35.8
	92				36.2
	93				36.6
	94		1		37.0
	95				37.4
	96				37.8

General length frequency breakdowns - Male and Female:
Jacks - 64 cm and under, 4-y-o - 65 cm to 82 cm, 5-y-o - 83 cm and over.

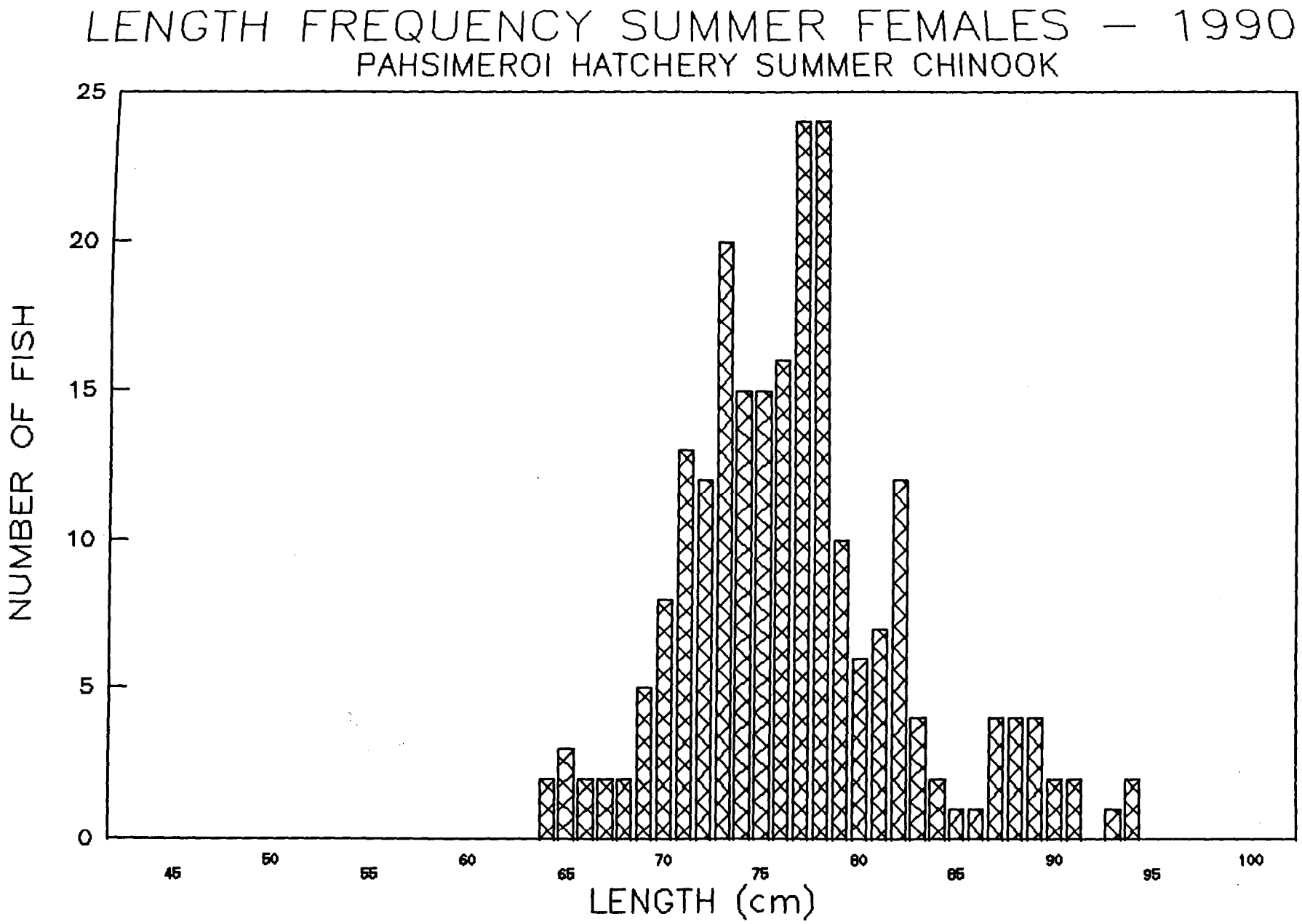
Appendix 3. Length frequency of spawned summer Chinook, 1990.

	(cm) Length	Jacks	Adult males	Adult females	(inches) Lenqth
	44				17.3
	45				17.7
	46				18.1
	47				18.5
	48				18.9
S	49				19.3
p	50				19.7
a	51				20.1
w	52				20.5
n	53				20.9
e	54	2			21.3
d	55				21.7
	56				22.0
F	57				22.4
	58				22.8
s	59				23.2
h	60	1			23.6
	61				24.0
	62				24.4
	63	4			24.8
	64	8		2	25.2
	65		1	3	25.6
	66	2	4	2	26.0
	67		6	1	26.4
	68		7	2	26.8
	69		11	3	27.2
	70		10	6	27.6
	71		4	6	28.0
	72		8	8	28.3
	73		14	19	28.7
	74		10	7	29.1
	75		11	12	29.5
	76		6	9	29.9
	77		9	18	30.3
	78		8	18	30.7
	79		6	8	31.1
	80		9	3	31.5
	81		6	6	31.9
end [4]	82		5	9	32.3
5's	83		2	2	32.7
	84		1	2	33.1
	85		1	1	33.5
	86		1		33.9
	87		1	2	34.2
	88			4	34.6
	89			2	35.0
	90			2	35.4
	91			2	35.8
	92				36.2
	93			1	36.6
	94		1	2	37.0
	95				37.4
	96				37.8

General length frequency breakdowns - Male and Female:
Jacks - 64 cm and under, 4-y-o - 65 cm to 5-y-o - 83 on and over.



Appendix 4. Length frequency of summer chinook males, 1990.



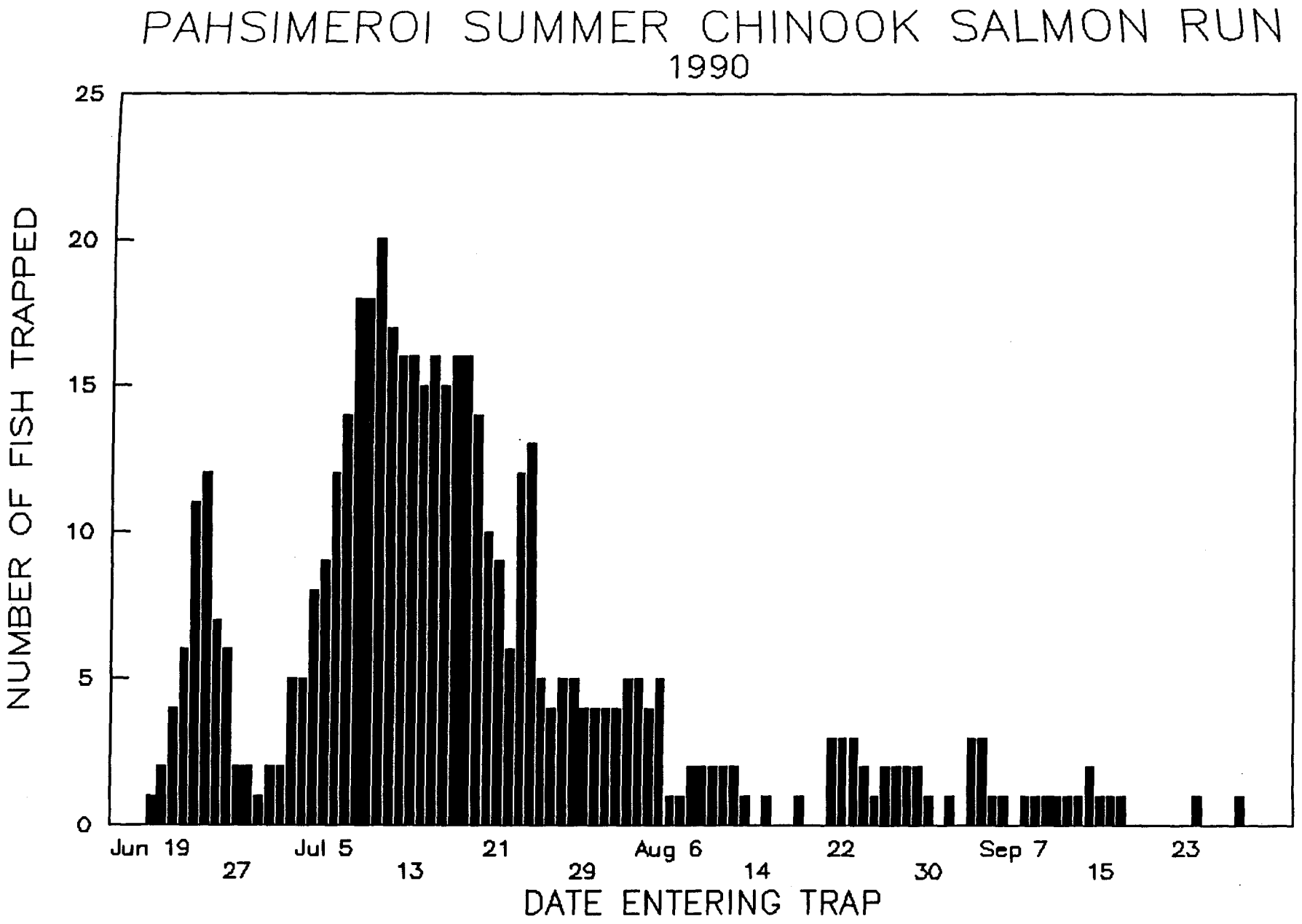
Appendix 5. Length frequency of summer chinook females, 1990.

Appendix 6. Pahsimeroi Hatchery run timing for brood year 1990

Date	Total	Jacks	Males	Females
JUN 19	1		1	1
1	2		1	1
2	4	1	2	1
3	6	2	2	2
4	11	2	3	6
5	12	2	4	6
6	7	1	2	4
7	6	1	2	3
8	2		1	1
9	2		2	
10	1		0	1
11	2		1	1
JUL 1	2		1	1
2	5	1	2	2
3	5		3	2
4	8	1	3	4
5	9		6	3
6	12	2	5	5
7	14	1	5	8
8	18		10	8
9	18	1	9	8
10	20	1	9	10
11	17	1	8	8
12	16	1	8	7
13	16	2	8	6
14	15	1	7	7
15	16	1	7	8
16	15	1	5	9
17	16	1	5	10
18	16	1	5	10
19	14		5	9
20	10		4	6
21	9		4	5
22	6		4	2
23	12		6	6
24	13		6	7
25	5		2	3
26	4	1		3
27	5	1	2	2
28	5	1	1	3
29	4		2	2
30	4		2	2
31	4		2	2
AUG 1	4		2	2
2	5	1	3	1
3	5	1	2	2
4	4	1	2	1
5	5	1	1	3
6	1	1		
7	1		1	
8	2		1	1
9	2	1	1	
10	2			2

Appendix 6. Continued.

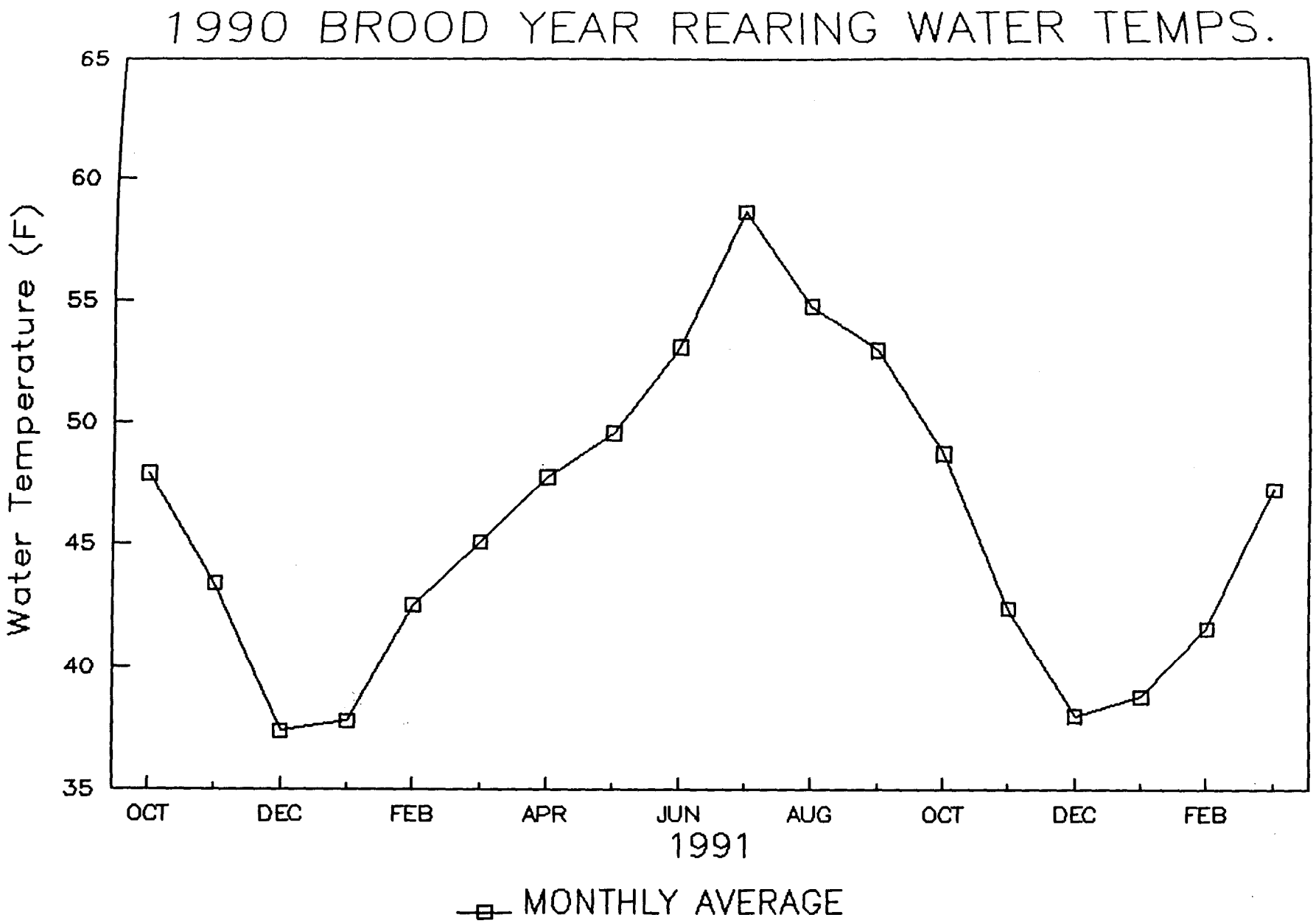
Date	Total	Jacks	Males	Females
11	2		1	1
12	2		1	1
13	1	1		
14				
15	1			1
16				
17				
18	1		1	
19				
20				
21	3		3	
22	3		2	1
23	3	1	1	1
24	2		2	
25	1			1
26	2		1	1
27	2		2	
28	2		1	1
29	2		2	
30	1			1
31				
SEP 1	1		1	
2				
3	3		1	2
4	3		1	2
5	1			1
6	1		1	
7				
8	1			1
9	1			1
10	1	1		
11	1		1	
12	1		1	
13	1	1		
14	2	1		1
15	1			1
16	1			
17	1		1	
18				
19				
20				
21				
22				
23				
24			1	
25				
26				
*				
OCT 5	1		1	
TOTALS	470	39	206	225



Appendix 7. Pahsimeroi Hatchery summer chinook run timing.

Appendix 8. Pahsimeroi Hatchery summer chinook releases and returns.

Released	Number	Number at age of return				Year of return	Percent return
		3 yrs	4 yrs	5 yrs	Total		
MAY 1970	300,000	89	N/A	94	N/A	71, 72, 73	N/A
MAY 1971	250,000	40	410	14	464	72, 73, 74	0.186
MAY 1972	250,000	19	138	76	233	73, 74, 75	0.093
MAY 1973	347,000	1	5	32	38	74, 75, 76	0.011
MAY 1974	330,000	8	189	414	611	75, 76, 77	0.185
MAY 1975	114,000	53	109	X	X	76, 77, 78	X
MAY 1976	121,000	6	X	32	X	77, 78, 79	X
MAY 1977	235,000	X	0	4	X	78, 79, 80	X
MAY 1978	218,000	1	29	13	43	79, 80, 81	0.020
MAR 1983	13,690	11	72	30	113	84, 85, 86	0.825
APR 1984	55,800	27	278	52	357	85, 86, 87	0.640
APR 1985	209,155	37	408	716	1,161	86, 87, 88	0.555
MAR 1986	12,095	13	47	31	91	87, 88, 89	0.752
MAR 1987	258,600	75	180	42	297	88, 89, 90	0.115
MAR 1988	598,500	135	389	79	603	89, 90, 91	0.101
MAR 1989	1,016,300	39	139	27	205	90, 91, 92	0.020
MAR 1990	1,058,000	20	98		118	91, 92, 93	0.011
MAR 1991	227,500	6			6	92, 93, 94	0.003
MAR 1992	605,900				0	93, 94, 95	0.000
Pahsimeroi spring chinook releases and returns							
MAR 1983	437,332	97	1,568	398	2,063	84, 85, 86	0.472
APR 1984	1,143,029	480	6,019	1,463	7,962	85, 86, 87	0.697
APR 1985	178,782	101	677	216	994	86, 87, 88	0.556
MAR 1986	80,948	35	185	49	269	87, 88, 89	0.332



Appendix 9. Brood year 1990 rearing water temperatures.

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Appendix 10. Survival of green eggs to smolt, brood year 1990 summer chinook.

Green egg number	Eyed egg number	Percent survival	500/lb number	Percent survival	Released smolts	Percent survival
662,641	631,342	95.25	608,893	91.88	605,900	91.44

Appendix 11. Brood year production costs.

Number fish	Lbs of fish	Lbs of feed	Cost of feed	Average conversion	Total[a] cost	Cost/ thousand	Cost/ lb
605,900	39,502	62,073	$26,360	1.59	$161,325	$266.26	$4.08

[a]Estimated total budget (minus capital outlay) for an entire 18-month rearing cycle. October 1990 to March 1992.

Appendix 12. Fish marking.

Date marked	No. fish marked	Type of mark	Purpose	Number marked fish released	Site group fish released
NOV 1991	302	PIT Tag	assess downstream migration	302	605,900

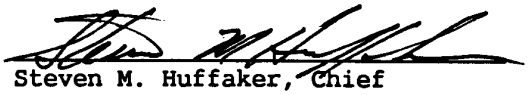
Submitted by:

Bob Moore
Fish Hatchery Superintendent II

Julia Rensel Hislop
Fish Hatchery Superintendent I

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME



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